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Te-Ming Chiu

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EXAMINER

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/714,617

Applicant(s)

CHIU ET AL.

Examiner

ERIC YEN

Art Unit

2626

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/SE/US)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. In response to the Final Office Action mailed 10/1/07, applicant has submitted an amendment and Request for Continued Examination filed 12/28/07.

Claims 1, 11-15, 17, 21, 28, 29, 31, and 36-38, have been amended.

Response to Arguments

2. Applicant's arguments with respect to claims 1, 11, 28, 31, 36 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1-7, 9-25, and 27-38** are rejected under 35 U.S.C. 103(a) as being unpatentable over PARK et al. (Patent No.: US 6,529,604) in view Kobayashi et al. (US 6,728,739), hereafter Kobayashi.

3. Regarding **claim 1**, PARK teaches a method for processing audio signals ("encode and decode scalable stereo digital audio data", column 6, lines 53-54) comprising:

quantizing the audio signals in spectral lines into quantized data in a plurality of sub-bands ("quantizing portion 160 scalar-quantizes the frequency signals of each band", column 7, lines 65-66) in an order of most significant bits to least significant bits ("ranging from the MSB sequences to the LSB sequences", column 8, lines 23-24);

determining, according to a psychoacoustic model, a plurality of scale factors corresponding to each of the sub-bands ("scale factors for the respective scale factor bands... are generated", column 9, lines 45-47; "psychoacoustic model", col. 16, lines 18-46) according to respective noise tolerance of each of the sub-bands ("so that the magnitude of the quantization noise of each scale factor band is smaller than the masking threshold", column 9, lines 42-43);

coding the quantized data ("bitstream forming portion 180 generates bitstreams", column 8, line 33); and

truncating the quantized data ("bitstreams of lower bitrate", column 8, line 39).

However PARK does not disclose for each scale factor that exceeds a threshold value, bit shifting the quantized data in the corresponding sub-band by the scale factors.

Kobayashi teaches for each scale factor that exceeds a threshold value, bit shifting the quantized data in the corresponding sub-band by the scale factors ("scale factor... having the largest absolute value... group scale factor... scaling is performed on each piece of the calculated... scale factor can be, for example, the amount of the shift

in the bit shift of data... scaling is performed by shifting bits for data by an amount of the shift corresponding to the scale factor", col. 5, lines 3-33; where the "threshold" exceeded is the value of the second largest scale factor in each sub-band, and "each piece" that this scaling is applied to can be applied to the sub-bands in Park).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include the teaching of Kobayashi of for each scale factor that exceeds a threshold value, bit shifting the quantized data in the corresponding sub-band by the scale factors, in order to improve precision in obtaining coding values, as described by Kobayashi (col. 4, lines 38-42).

4. Regarding **claim 2**, PARK further teaches:

de-quantizing the coded data ("inverse quantizing portion 320 restores the decoded scale factor and quantized data into signals having the original magnitudes", column 9, lines 21-23); and

decoding the coded data ("bit-sliced arithmetic decoding portion 310 decodes side information and bit-sliced quantized data", column 8, lines 62-63).

However PARK does not disclose de-shifting the coded data.

Kobayashi teaches de-shifting the coded data ("scale factor... having the largest absolute value... group scale factor... scaling is performed on each piece of the calculated... scale factor can be, for example, the amount of the shift in the bit shift of data... scaling is performed by shifting bits for data by an amount of the shift corresponding to the scale factor", col. 5, lines 3-33; "second shifter... scaling data

based on a given scale factor... first shifter... to the right... to the left", col. 11, lines 29-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include the teaching of Kobayashi of de-shifting the coded data, in order to improve precision in obtaining coding values, as described by Kobayashi (col. 4, lines 38-42).

5. Regarding **claim 3**, PARK further teaches:

amplifying the quantized data with the respective scale factors ("quantizing portion 160 scalar-quantizes the frequency signals of each band so that the magnitude of the quantization noise of each band is smaller than the masking threshold", column 7, lines 65-67); and

de-amplifying the decoded data with the respective scale factors ("inverse quantizing portion 320 restores the decoded scale factor and quantized data into signals having the original magnitudes", column 9, lines 21-23).

6. Regarding **claim 4**, PARK further teaches determining a difference of the quantized data and the de-quantized data ("difference between the predicted value and the actual frequency component is quantized and coded", column 7, lines 47-49).

7. Regarding **claim 5**, PARK further teaches coding the quantized data in a base layer and an enhancement layer ("after the coding of the base layer is completed, the

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side information for the next enhancement layer and the quantized values of audio data are coded", column 8, lines 28-31).

8. Regarding **claim 6**, PARK further teaches truncating the quantized data in the enhancement layer up to respective layer size limits ("remaining quantized data uncoded due to a layer size limit", column 6, lines 16-17).

9. Regarding **claim 7**, PARK further teaches arithmetically coding the quantized data ("bit-sliced data are arithmetic-coded", column 11, lines 15-16).

10. Regarding **claim 9**, PARK further teaches converting the audio signals from a time domain to a frequency domain ("time/frequency mapping portion 100 converts input audio signals of a temporal domain in to audio signals of a frequency domain", column 7, lines 23-25).

11. Regarding **claim 10**, PARK further teaches converting the decoded data from a frequency domain to a time domain ("frequency/time mapping portion 370 converts inversely quantized signals into signals of a temporal domain", column 9, lines 24-25).

12. Regarding **claim 11**, PARK teaches a system having an encoder and decoder processing audio signals ("encode and decode scalable stereo digital audio data", column 6, lines 53-54) comprising:

an encoder ("encoding apparatus", column 6, line 64) including a quantizer quantizing the audio signals in spectral lines into quantized data in a plurality of sub-bands ("quantizing portion 160 scalar-quantizes the frequency signals of each band", column 7, lines 65-66) in an order of most significant bits to least significant bits ("ranging from the MSB sequences to the LSB sequences", column 8, lines 23-24);

a psychoacoustic model determining a plurality of scale factors corresponding to each of the sub-bands ("scale factors for the respective scale factor bands... are generated", column 9, lines 45-47; "psychoacoustic model", col. 16, lines 18-46) according to respective noise tolerance of each of the sub-bands ("so that the magnitude of the quantization noise of each scale factor band is smaller than the masking threshold", column 9, lines 42-43);

a coder coding the quantized data ("bitstream forming portion 180 generates bitstreams", column 8, line 33);

a de-quantizer de-quantizing the quantized data ("inverse quantizing portion 320 restores the decoded scale factor and quantized data into signals having the original magnitudes", column 9, lines 21-23);

a subtractor taking a difference of the quantized data and the de-quantized data ("difference between the predicted value and the actual frequency component is quantized and coded", column 7, lines 47-49); and

a bit slicer coding ("bit-sliced arithmetic coding portion 170", column 8, line 18) and truncating the difference ("bitstreams of lower bitrate", column 8, line 39).

However PARK does not disclose a bit shifter to shift the difference by the corresponding scale factor in each of the sub-bands in which the corresponding scale factor exceeds a threshold value.

Kobayashi suggests a bit shifter to shift the difference by the corresponding scale factor in each of the sub-bands in which the corresponding scale factor exceeds a threshold value ("scale factor... having the largest absolute value... group scale factor... scaling is performed on each piece of the calculated... scale factor can be, for example, the amount of the shift in the bit shift of data... scaling is performed by shifting bits for data by an amount of the shift corresponding to the scale factor", col. 5, lines 3-33; where the "threshold" exceeded is the value of the second largest scale factor in each sub-band, and "each piece" that this scaling is applied to can be applied to the sub-bands in Park).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include the teaching of Kobayashi of a bit shifter to shift the difference by the corresponding scale factor in each of the sub-bands in which the corresponding scale factor exceeds a threshold value, in order to improve precision in obtaining coding values, as described by Kobayashi (col. 4, lines 38-42).

13. Regarding **claim 12**, PARK further teaches:

a decoder having a scale factor decoder decoding the scale factors ("inverse quantizing portion 320 restores the decoded scale factor and quantized data into signals having the original magnitudes", column 9, lines 21-23);

a spectrum decoder decoding the quantized data ("inverse quantizing portion 320 restores the decoded scale factor and quantized data into signals having the original magnitudes", column 9, lines 21-23); and

a decoder decoding the coded data ("bit-sliced arithmetic decoding portion 310 decodes side information and bit-sliced quantized data", column 8, lines 62-63).

However PARK does not disclose de-shifting the coded data.

Kobayashi teaches de-shifting the coded data ("scale factor... having the largest absolute value... group scale factor... scaling is performed on each piece of the calculated... scale factor can be, for example, the amount of the shift in the bit shift of data... scaling is performed by shifting bits for data by an amount of the shift corresponding to the scale factor", col. 5, lines 3-33; "second shifter... scaling data based on a given scale factor... first shifter... to the right... to the left", col. 11, lines 29-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include the teaching of Kobayashi of de-shifting the coded data, in order to improve precision in obtaining coding values, as described by Kobayashi (col. 4, lines 38-42).

14. Regarding **claim 13**, PARK further teaches a filter converting the quantized data from a time domain to a frequency domain ("time/frequency mapping portion 100 converts input audio signals of a temporal domain in to audio signals of a frequency domain", column 7, lines 23-25).

15. Regarding **claim 14**, PARK further teaches a filter converting the decoded data from a frequency domain to a time domain ("frequency/time mapping portion 370 converts inversely quantized signals into signals of a temporal domain", column 9, lines 24-25).

16. Regarding **claim 15**, PARK further teaches an adder adding the decoded data ("predicted signal is added with a difference signal decoded by the bitstream analyzing portion 300", column 9, lines 7-8).

17. Regarding **claim 16**, PARK further teaches that the quantized data are amplified ("quantizing portion 160 scalar-quantizes the frequency signals of each band so that the magnitude of the quantization noise of each band is smaller than the masking threshold", column 7, lines 65-67) and, the decoded data de-amplified, with the respective scale factors ("inverse quantizing portion 320 restores the decoded scale factor and quantized data into signals having the original magnitudes", column 9, lines 21-23).

18. Regarding **claim 17**, PARK further teaches a bit slice arithmetic encoder coding the quantized data ("bit-sliced data are arithmetic-coded", column 11, lines 15-16).

19. Regarding **claim 18**, PARK further teaches that the system is implemented in an additive fine granularity scalability structure ("fine granule scalability can be implemented", column 12, line 65).

Regarding **claim 19**, Park fails to teach that the least significant bits are discarded after the bit shifting.

Kobayashi further teaches that the least significant bits are discarded after the bit shifting ("scale factor... having the largest absolute value... group scale factor... scaling is performed on each piece of the calculated... scale factor can be, for example, the amount of the shift in the bit shift of data... scaling is performed by shifting bits for data by an amount of the shift corresponding to the scale factor", col. 5, lines 3-33; "second shifter... scaling data based on a given scale factor... first shifter... to the right... to the left", col. 11, lines 29-50; bit-shifts leave no data in the locations the bits are shifted from [i.e., discarded]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include the teaching of Kobayashi of that the least significant bits are discarded after the bit shifting, in order to improve precision in obtaining coding values, as described by Kobayashi (col. 4, lines 38-42).

20. Regarding **claim 20**, PARK further teaches that the quantized difference is coded in a base layer and an enhancement layer ("after the coding of the base layer is completed, the side information for the next enhancement layer and the quantized

values of audio data are coded", column 8, lines 28-31), and the quantized difference in the enhancement layer is truncated up to respective layer size limits ("remaining quantized data uncoded due to a layer size limit", column 6, lines 16-17).

21. Regarding **claim 21**, PARK teaches a method for processing audio signals ("encode and decode scalable stereo digital audio data", column 6, lines 53-54) comprising:

quantizing the audio signals in spectral lines into quantized data in a plurality of sub-bands ("quantizing portion 160 scalar-quantizes the frequency signals of each band", column 7, lines 65-66) in an order of most significant bits to least significant bits ("ranging from the MSB sequences to the LSB sequences", column 8, lines 23-24);

determining, according to a psychoacoustic model, a plurality of scale factors corresponding to each of the sub-bands ("scale factors for the respective scale factor bands... are generated", column 9, lines 45-47; "psychoacoustic model", col. 16, lines 18-46) according to respective noise tolerance of each of the sub-bands ("so that the magnitude of the quantization noise of each scale factor band is smaller than the masking threshold", column 9, lines 42-43);

coding the quantized data in a base layer ("coding of the base layer", column 8, lines 28-29); and

truncating the quantized data ("bitstreams of lower bitrate", column 8, line 39).

However PARK does not disclose for each scale factor that exceeds a threshold value, bit shifting the quantized data in the corresponding sub-band by the scale factors.

Kobayashi suggests for each scale factor that exceeds a threshold value, bit shifting the quantized data in the corresponding sub-band by the scale factors ("scale factor... having the largest absolute value... group scale factor... scaling is performed on each piece of the calculated... scale factor can be, for example, the amount of the shift in the bit shift of data... scaling is performed by shifting bits for data by an amount of the shift corresponding to the scale factor", col. 5, lines 3-33; where the "threshold" exceeded is the value of the second largest scale factor in each sub-band, and "each piece" that this scaling is applied to can be applied to the sub-bands in Park).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include the teaching of Kobayashi of for each scale factor that exceeds a threshold value, bit shifting the quantized data in the corresponding sub-band by the scale factors, in order to improve precision in obtaining coding values, as described by Kobayashi (col. 4, lines 38-42).

22. Regarding **claim 22**, PARK further teaches:

de-quantizing the coded data ("inverse quantizing portion 320 restores the decoded scale factor and quantized data into signals having the original magnitudes", column 9, lines 21-23); and

decoding the coded data ("bit-sliced arithmetic decoding portion 310 decodes side information and bit-sliced quantized data", column 8, lines 62-63).

However PARK does not disclose de-shifting the coded data.

Kobayashi teaches de-shifting the coded data ("scale factor... having the largest absolute value... group scale factor... scaling is performed on each piece of the calculated... scale factor can be, for example, the amount of the shift in the bit shift of data... scaling is performed by shifting bits for data by an amount of the shift corresponding to the scale factor", col. 5, lines 3-33; "second shifter... scaling data based on a given scale factor... first shifter... to the right... to the left", col. 11, lines 29-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include the teaching of Kobayashi of de-shifting the coded data, in order to improve precision in obtaining coding values, as described by Kobayashi (col. 4, lines 38-42).

Regarding **claim 23**, Park fails to teach that the least significant bits are discarded after the bit shifting.

Kobayashi further teaches that the least significant bits are discarded after the bit shifting ("scale factor... having the largest absolute value... group scale factor... scaling is performed on each piece of the calculated... scale factor can be, for example, the amount of the shift in the bit shift of data... scaling is performed by shifting bits for data by an amount of the shift corresponding to the scale factor", col. 5, lines 3-33; "second shifter... scaling data based on a given scale factor... first shifter... to the right... to the left", col. 11, lines 29-50; bit-shifts leave no data in the locations the bits are shifted from [i.e., discarded]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include the teaching of Kobayashi of that the least significant bits are discarded after the bit shifting, in order to improve precision in obtaining coding values, as described by Kobayashi (col. 4, lines 38-42).

23.

24. Regarding **claim 24**, PARK further teaches:

coding the quantized data in a base layer and an enhancement layer ("after the coding of the base layer is completed, the side information for the next enhancement layer and the quantized values of audio data are coded", column 8, lines 28-31); and

truncating the quantized data in the enhancement layer up to respective layer size limits ("remaining quantized data uncoded due to a layer size limit", column 6, lines 16-17).

25. Regarding **claim 25**, PARK further teaches arithmetically coding the quantized data ("bit-sliced data are arithmetic-coded", column 11, lines 15-16).

26. Regarding **claim 27**, PARK further teaches that method is implemented in an additive fine granularity scalability structure ("fine granule scalability can be implemented", column 12, line 65).

27. Regarding **claim 28**, PARK teaches a system having an encoder and decoder processing audio signals ("encode and decode scalable stereo digital audio data", column 6, lines 53-54) comprising:

an encoder ("encoding apparatus", column 6, line 64) further comprising a quantizer quantizing the audio signals in spectral lines into quantized data in a plurality of sub-bands ("quantizing portion 160 scalar-quantizes the frequency signals of each band", column 7, lines 65-66) in an order of most significant bits to least significant bits ("ranging from the MSB sequences to the LSB sequences", column 8, lines 23-24);

a psychoacoustic model determining a plurality of scale factors corresponding to each of the sub-bands ("scale factors for the respective scale factor bands... are generated", column 9, lines 45-47; "psychoacoustic model", col. 16, lines 18-46) according to respective noise tolerance of each of the sub-bands ("so that the magnitude of the quantization noise of each scale factor band is smaller than the masking threshold", column 9, lines 42-43);

a bit slicer coding ("bit-sliced arithmetic coding portion 170", column 8, line 18) and truncating the difference ("bitstreams of lower bitrate", column 8, line 39).

However PARK does not disclose a bit shifter to shift the quantized data by the corresponding scale factor in each of the sub-bands in which the corresponding scale factor exceeds a threshold value.

Kobayashi suggests a bit shifter to shift the quantized data by the corresponding scale factor in each of the sub-bands in which the corresponding scale factor exceeds a

threshold value ("scale factor... having the largest absolute value... group scale factor... scaling is performed on each piece of the calculated... scale factor can be, for example, the amount of the shift in the bit shift of data... scaling is performed by shifting bits for data by an amount of the shift corresponding to the scale factor", col. 5, lines 3-33; where the "threshold" exceeded is the value of the second largest scale factor in each sub-band, and "each piece" that this scaling is applied to can be applied to the sub-bands in Park).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include the teaching of Kobayashi of a bit shifter to shift the quantized data by the corresponding scale factor in each of the sub-bands in which the corresponding scale factor exceeds a threshold value, in order to improve precision in obtaining coding values, as described by Kobayashi (col. 4, lines 38-42).

28. Regarding **claim 29**, PARK further teaches a decoder comprising:

a scale factor decoder decoding the scale factors ("inverse quantizing portion 320 restores the decoded scale factor and quantized data into signals having the original magnitudes", column 9, lines 21-23);

a spectrum decoder decoding the quantized data ("inverse quantizing portion 320 restores the decoded scale factor and quantized data into signals having the original magnitudes", column 9, lines 21-23); and

a decoder decoding the coded data ("bit-sliced arithmetic decoding portion 310 decodes side information and bit-sliced quantized data", column 8, lines 62-63).

However PARK does not disclose de-shifting the coded data.

Kobayashi teaches de-shifting the coded data ("scale factor... having the largest absolute value... group scale factor... scaling is performed on each piece of the calculated... scale factor can be, for example, the amount of the shift in the bit shift of data... scaling is performed by shifting bits for data by an amount of the shift corresponding to the scale factor", col. 5, lines 3-33; "second shifter... scaling data based on a given scale factor... first shifter... to the right... to the left", col. 11, lines 29-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include the teaching of Kobayashi of de-shifting the coded data, in order to improve precision in obtaining coding values, as described by Kobayashi (col. 4, lines 38-42).

29. Regarding **claim 30**, PARK further teaches that the system is implemented in MPEG-4 bit slice arithmetic coding ("bit-sliced arithmetic coding technique", column 6, lines 54-55).

30. Regarding **claim 31**, PARK teaches a method for processing audio signals ("encode and decode scalable stereo digital audio data", column 6, lines 53-54) comprising:

quantizing the audio signals in spectral lines into quantized data in a plurality of sub-bands ("quantizing portion 160 scalar-quantizes the frequency signals of each

band", column 7, lines 65-66) in an order of most significant bits to least significant bits ("ranging from the MSB sequences to the LSB sequences", column 8, lines 23-24);

determining, according to a psychoacoustic model, a plurality of scale factors corresponding to each of the sub-bands ("scale factors for the respective scale factor bands... are generated", column 9, lines 45-47; "psychoacoustic model", col. 16, lines 18-46) according to respective noise tolerance of each of the sub-bands ("so that the magnitude of the quantization noise of each scale factor band is smaller than the masking threshold", column 9, lines 42-43);

de-quantizing the coded data ("inverse quantizing portion 320 restores the decoded scale factor and quantized data into signals having the original magnitudes", column 9, lines 21-23);

coding ("bit-sliced arithmetic coding portion 170", column 8, line 18) and truncating the quantized difference ("bitstreams of lower bitrate", column 8, line 39).

However PARK does not disclose for each scale factor that exceeds a threshold value, bit shifting the quantized data in the corresponding sub band by the scale factor.

Kobayashi suggests for each scale factor that exceeds a threshold value, bit shifting the quantized data in the corresponding sub band by the scale factor ("scale factor... having the largest absolute value... group scale factor... scaling is performed on each piece of the calculated... scale factor can be, for example, the amount of the shift in the bit shift of data... scaling is performed by shifting bits for data by an amount of the shift corresponding to the scale factor", col. 5, lines 3-33; where the "threshold"

exceeded is the value of the second largest scale factor in each sub-band, and "each piece" that this scaling is applied to can be applied to the sub-bands in Park).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include the teaching of Kobayashi of for each scale factor that exceeds a threshold value, bit shifting the quantized data in the corresponding sub band by the scale factor, in order to improve precision in obtaining coding values, as described by Kobayashi (col. 4, lines 38-42).

31. Regarding **claim 32**, PARK further teaches:

decoding the coded data ("bit-sliced arithmetic decoding portion 310 decodes side information and bit-sliced quantized data", column 8, lines 62-63).

However PARK does not disclose de-shifting the coded data.

Kobayashi teaches de-shifting the coded data ("scale factor... having the largest absolute value... group scale factor... scaling is performed on each piece of the calculated... scale factor can be, for example, the amount of the shift in the bit shift of data... scaling is performed by shifting bits for data by an amount of the shift corresponding to the scale factor", col. 5, lines 3-33; "second shifter... scaling data based on a given scale factor... first shifter... to the right... to the left", col. 11, lines 29-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include the teaching of Kobayashi of de-shifting the coded data, in

order to improve precision in obtaining coding values, as described by Kobayashi (col. 4, lines 38-42).

32. Regarding **claim 33**, PARK further teaches:

amplifying the quantized data with the respective scale factors ("quantizing portion 160 scalar-quantizes the frequency signals of each band so that the magnitude of the quantization noise of each band is smaller than the masking threshold", column 7, lines 65-67); and

de-amplifying the decoded data with the respective scale factors ("inverse quantizing portion 320 restores the decoded scale factor and quantized data into signals having the original magnitudes", column 9, lines 21-23).

33. Regarding **claim 34**, PARK further teaches arithmetically coding the quantized data ("bit-sliced data are arithmetic-coded", column 11, lines 15-16).

Regarding **claim 35**, Park fails to teach that the least significant bits are discarded after the bit shifting.

Kobayashi further teaches that the least significant bits are discarded after the bit shifting ("scale factor... having the largest absolute value... group scale factor... scaling is performed on each piece of the calculated... scale factor can be, for example, the amount of the shift in the bit shift of data... scaling is performed by shifting bits for data by an amount of the shift corresponding to the scale factor", col. 5, lines 3-33; "second

shifter... scaling data based on a given scale factor... first shifter... to the right... to the left", col. 11, lines 29-50; bit-shifts leave no data in the locations the bits are shifted from [i.e., discarded]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include the teaching of Kobayashi of that the least significant bits are discarded after the bit shifting, in order to improve precision in obtaining coding values, as described by Kobayashi (col. 4, lines 38-42).

34.

35. Regarding **claim 36**, PARK teaches a processor for processing audio signals in an order of most significant bits to least significant bits ("coded in the order ranging from the MSB sequences to the LSB sequences", column 8, lines 23-24), the processor comprising:

a psychoacoustic model determining a plurality of scale factors corresponding to each of the sub-bands ("scale factors for the respective scale factor bands... are generated", column 9, lines 45-47; "psychoacoustic model", col. 16, lines 18-46) according to respective noise tolerance of each of the sub-bands ("so that the magnitude of the quantization noise of each scale factor band is smaller than the masking threshold", column 9, lines 42-43); and

a bit slicer coding ("bit-sliced arithmetic coding portion 170", column 8, line 18) and truncating the quantized difference ("bitstreams of lower bitrate", column 8, line 39).

However PARK does not disclose a bit shifter to shift the processed audio signals by the corresponding scale factor in each of the spectral sub-bands in which the corresponding scale factor exceeds a threshold value.

Kobayashi suggests a bit shifter to shift the processed audio signals by the corresponding scale factor in each of the spectral sub-bands in which the corresponding scale factor exceeds a threshold value ("scale factor... having the largest absolute value... group scale factor... scaling is performed on each piece of the calculated... scale factor can be, for example, the amount of the shift in the bit shift of data... scaling is performed by shifting bits for data by an amount of the shift corresponding to the scale factor", col. 5, lines 3-33; where the "threshold" exceeded is the value of the second largest scale factor in each sub-band, and "each piece" that this scaling is applied to can be applied to the sub-bands in Park).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include the teaching of Kobayashi of a bit shifter to shift the processed audio signals by the corresponding scale factor in each of the spectral sub-bands in which the corresponding scale factor exceeds a threshold value, in order to improve precision in obtaining coding values, as described by Kobayashi (col. 4, lines 38-42).

36. Regarding **claim 37**, PARK further teaches a quantizer quantizing the processed audio signals ("quantizing portion 160 scalar-quantizes the frequency signals of each band", column 7, lines 65-66).

37. Regarding **claim 38**, PARK further teaches:

a quantizer quantizing the processed audio signals ("quantizing portion 160 scalar-quantizes the frequency signals of each band", column 7, lines 65-66);

a de-quantizer de-quantizing the processed audio signals ("inverse quantizing portion 320 restores the decoded scale factor and quantized data into signals having the original magnitudes", column 9, lines 21-23); and

a subtractor taking a difference between the quantized audio signals and the de-quantized audio signals ("difference between the predicted value and the actual frequency component is quantized and coded", column 7, lines 47-49).

38. **Claims 8 and 26** are rejected under 35 U.S.C. 103(a) as being unpatentable over PARK et al. (Patent No.: US 6,529,604) in view Kobayashi, as applied to claims 1 and 21 in further view of TSUSHIMA et al. (Patent No.: US 6,678,653).

39. Regarding **claim 8**, PARK and Kobayashi teach all of the claimed limitations of claim 1. However, PARK and Kobayashi do not disclose that the scale factor of a sub-band is determined based upon an original spectral energy level, a common scale factor, and band scale factor values of the sub-band.

In the same field of signal coding, TSUSHIMA teaches that the scale factor of a sub-band ("absolute scale factor ASF(B)", TSUSHIMA, column 4, lines 19-20) is determined based upon an original spectral energy level (see TSUSHIMA, column 5,

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equation [2], $SF(B)$ is calculated using a MDCT, the MDCT outputs spectral energy levels), a common scale factor ("value of the common scale factor Com", TSUSHIMA, column 4, line 22), and band scale factor values of the sub-band ("scale factor $SF(B)$ ", TSUSHIMA, column 4, line 23).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to calculate the scale factor used by PARK and Kobayashi using the method of TSUSHIMA in order to "decrease the quantity of calculation" (TSUSHIMA, column 1, lines 48-49).

40. Regarding **claim 26**, PARK and Kobayashi teach all of the claimed limitations of claim 21. However, PARK and Kobayashi do not disclose that the scale factor of a sub-band is determined based upon an original spectral energy level, a common scale factor, and band scale factor values of the sub-band.

In the same field of signal coding, TSUSHIMA teaches that the scale factor of a sub-band ("absolute scale factor $ASF(B)$ ", TSUSHIMA, column 4, lines 19-20) is determined based upon an original spectral energy level (see TSUSHIMA, column 5, equation [2], $SF(B)$ is calculated using a MDCT, the MDCT outputs spectral energy levels), a common scale factor ("value of the common scale factor Com", TSUSHIMA, column 4, line 22), and band scale factor values of the sub-band ("scale factor $SF(B)$ ", TSUSHIMA, column 4, line 23).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to calculate the scale factor used by PARK and

Kobayashi using the method of TSUSHIMA in order to "decrease the quantity of calculation" (TSUSHIMA, column 1, lines 48-49).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ERIC YEN whose telephone number is (571)272-4249. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on 571-272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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3/28/08
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